Short communication

Spontaneous poisoning by *Solanum subinerme* Jack as a cause of cerebellar cortical degeneration in cattle

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**Article info**

*Article history:*
Received 13 October 2013
Received in revised form 27 January 2014
Accepted 4 February 2014
Available online 18 February 2014

**Keywords:**
Cattle diseases
Nervous system
Neuronal degeneration
*Solanum subinerme*
Toxic plants

**Abstract**

The present work reports cerebellar degeneration in cattle associated with the ingestion of *Solanum subinerme* in northern Brazil. The main clinical signs were periodic crises with loss of balance, falls, opisthotonus, and nystagmus. The histological lesions consisted of diffuse vacuolation of the perikaryon of the Purkinje neurons, followed by the loss of these cells and their substitution by Bergman glia. It is concluded that *S. subinerme* is another species of *Solanum* that causes cerebellar degeneration in cattle.

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The genus *Solanum* of the family *Solanaceae* contains several species that affect cattle and cause Purkinje cell degeneration, including *Solanum kwebense* in South Africa (Pienaar et al., 1976; van der Lugt et al., 2010), *Solanum dimidiatum* in the USA (Menzies et al., 1979), *Solanum bonariense* L. (syn. *Solanum fastigiatum* Wild) in Uruguay (Verdes et al., 2006), Argentina (Odriozola et al., 2012), and southern Brazil, (Riet-Correa et al., 1983; Rech et al., 2006) and *Solanum paniculatum* in northeastern Brazil (Guaraná et al., 2011). The condition was also described in goats that ingested *Solanum cinereum* in Australia (Bourke, 1997) and *Solanum viarium* in the USA (Porter et al., 2003).

The disease in cattle is clinically characterized by periodical cerebellar-originated attacks and falls, without loss of consciousness, lasting up to one minute (Pienaar et al., 1976; Riet-Correa et al., 1983; Verdes et al., 2006; Guaraná et al., 2011). Most animals appear normal between episodes, but some may exhibit permanent cerebellar signs (Verdes et al., 2006; Guaraná et al., 2011). The main histologic lesions of spontaneous (Pienaar et al., 1976; Riet-Correa et al., 1983; Verdes et al., 2006; Guaraná et al., 2011) and experimental (Zambrano et al., 1985; Medeiros et al., 2004; Guaraná et al., 2011; Rego et al., 2012) poisoning are fine vacuolation in the perikaryon and loss of Purkinje cells, with their substitution by Bergman glia. In advanced cases, the severe loss of Purkinje cells and the atrophy of the molecular layer may cause a reduction in the size of the cerebellum (Rech et al., 2006). Large doses of *Solanum* spp. administered during long periods are necessary to cause poisoning in cattle. In experiments with dry plant the first clinical signs appeared 76–155 days after total doses of 140–180 g of dried leaves per kg body weight (Riet-Correa et al., 1983; Barros et al., 1987). In experiments with green leaves the first signs appeared after 128–260 days totaling 940–1024 g/kg bw (Barros et al., 1987; Verdes et al., 2006).
Solanum subinerme (Fig. 1) is commonly known as jurubeba in the Amazon region (Stehmann et al., 2010). In the state of Roraima, it is found mainly in the border of areas where native bushes are distributed among the native pastures (savannah). There are no reports on the toxicity of this plant. The present work aims to report the intoxication by S. subinerme in cattle in the state of Roraima, northern Brazil.

During a visit to a farm in the municipality of Cantá, in February 2010, 4 cows over 2 years old showed cerebellar nervous signs with falls and recovery within one minute. The attacks occurred sporadically whenever the cows were disturbed or fought with another cow. One six-year-old lactating cow was clinically examined. The animal showed loss of balance and falls with extension of the forelimbs, opisthotonus, and nystagmus (Fig. 2) as a result of the head raising test (raising the head of the animal for approximately 60 s and then suddenly releasing it). Following the attacks, the animal returned to a standing position in approximately one minute and showed no clinical signs afterward. According to the owner, the cow had been showing those signs for approximately one year. The farm had an area of approximately 400 ha, and S. subinerme began to appear as a weed after the beginning of pasture cultivation, mainly with Brachiaria humidicola, 20 years earlier. The disease had been occurring in the farm for the last 5–10 years and had affected 12 animals from a herd of approximately 100 bovines. Four of the previously affected animals were slaughtered, and another four died spontaneously. The grazing land areas showed intense invasion by a plant known as jurubeba, which was identified by Professor Odaci F. de Oliveira, of the Federal University of the Semiárid as S. subinerme Jacq. A voucher specimen of the plant was authenticated and deposited in the herbarium of the National Research Institute of the Amazonia (INPA) under the number 99433 Det - M-H-NEE. Other neighboring farmers mentioned the occurrence of the disease and the presence of S. subinerme on their farms.

Nine months after the clinical examination, the six-year-old cow was slaughtered, following a period of clinical manifestation of approximately 21 months. At the time of the slaughter, the animal presented good body condition. After slaughter, the brain was collected and fixed in 10% buffered formaldehyde. Sections of the frontal, parietal, temporal, and occipital cortex, corpus striatum, thalamus, rostral colliculi, cerebellar peduncles, cerebellum, pons,